

# Engineering Chemistry

It is the province of the mechanical engineer to obtain command of supplies of energy and by means of suitable appliances to direct these with maximum efficiency to the performance of work. In spite of the vast development of water powers, the utilization of heat energy derived from chemical action still remains the most important source of mechanical power.

Practically speaking, it may be said that the whole of this energy is obtained by promoting a chemical reaction between compounds containing carbon and hydrogen on the one hand and the oxygen present in the air on the other. These changes are exothermic, that is to say, after deduction of the energy required to break up the compounds of carbon and hydrogen employed, there is a surplus of energy set free as heat. This surplus reaches its maximum when the whole of the carbon is converted into carbon dioxide, or carbonic acid, and the whole of the hydrogen into water.

**Fuels.**—A material which is caused to enter into chemical action with the primary object of setting free a quantity of heat energy is a fuel. The practical fuels consist of vegetable matter or of the remains of vegetable structures metamorphosed in a greater or less degree by the action of geological forces. Such materials may be used in their raw or natural state as wood and woody by-products, peat, lignite, bituminous coal, anthracite, petroleum, \*and natural gas. They may also be subjected to a process of preparation or adaptation before use, and furnish the products known as charcoal, char, coke, briquettes, tar, oils, benzol, petrol, coal gas, producer and water gas. From the standpoint of the engineer who has to devise and operate appliances for the combustion of fuels, a more convenient classification is based on the state of aggregation of these bodies as solid, liquid and gaseous fuels.

## SOLID FUELS

The solid fuels in use consist of wood, lignite, coal, anthracite, charcoal, partially coked coal or char and coke. Pulverized coal from

its mode of combustion is more akin to a liquid fuel. Peat, on account of its bulky character, low heating power, and large content of water even when air-dried, is not an industrial fuel, although used domestically and, to a very limited extent, in distilleries. Similar disadvantages attend the use